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The Treatment of Bovine Coccidiosis with 4 : 4'-Diamino Diphenyl Sulphone*

by

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Coccidiosis in cattle is particularly well known in this country in its acute form marked by dysentery and tenesmus, as seen in the south-western counties and often diagnosed there as "Fern Poisoning," but in some parts, where more young cattle are reared and where hygienic conditions are unsatisfactory, the disease is of serious importance. It is probably often unrecognized in the more chronic form, and the unthriftiness may be attributed to intestinal worms. Since, however, more successful anthelmintic treatments became available it is to be expected that this type of coccidiosis will be increasingly recognized.

Acute coccidiosis occurs principally in calves and young cattle between one month and two years of age, but adult cows are also occasionally affected. Mortality may exceed 50 per cent. of the affected animals. The symptoms are: marked straining and the passing of blood, bloody mucus or blood-tinged diarrhoeic faeces. Subacute cases show nothing but diarrhoea with some degree of emaciation.

Diagnosis of acute coccidiosis can often be made by rectal examination, at which can be felt the rough eroded mucosa or on visual examination, the whitish ulceration can be seen, with or even without the aid of a speculum. Confirmation of a diagnosis of coccidiosis is supplied by microscopic examination of the faeces, in which Eimeria oocysts are present, but this method may sometimes be misleading, as in hyperacute cases bowel haemorrhage precedes the liberation of oocysts. Oocysts may also be scanty in the faeces but plentiful in the bloody mucus, so it may be advisable to examine smears of the latter also. Repeated microscopical examination should be made on suspected cases.

TREATMENT

The variety of drugs in use indicates the lack of success which attends treatment of this disease. In recent years several sulphonamides have been used and a very recently published review (N.V.M.A. publication 8 issued March 9th, 1946) summarizes the present position as follows: "There is no specific treatment for the disease. . . . There are indications that some of the sulphonamides may be of value in treatment, but research work is not sufficiently advanced to enable recommendation to be made for their use in veterinary practice for the control of bovine coccidiosis." B. T. Simms, the present chief of the United States Bureau of Animal Industry, stated as recently as October 11th, 1945, that "treatment is almost futile after the bloody diarrhoea appears, since at that time the parasites are buried in cells of the mucous membrane safe from molestation by medicament."

In the present investigation diamino diphenyl sulphone was used in doses which, when given orally once in every 24 hours, resulted in cessation of the dysentery within 48 to 72 hours and return to normal faeces generally within the next 24 hours. The oocyst counts were also reduced from levels between 200 to 25,000 per gramme to negligible numbers after a similar lapse of time (*i.e.*, two to three days).

It is hoped in a later paper, after further work has been done with other compounds, to review the whole field of treatment for bovine coccidiosis. The purpose of the present investigation was to find, if possible, a treatment which would be both effective and economical. Preliminary work involving the examination of speculative compounds for anti-coccidial activity was first undertaken in chickens, the full details of which will be published elsewhere. Early in that investigation (May, 1944) some activity was detected in 4:4'-dichloro diphenyl sulphone (Cl–C$_6$H$_4$–SO$_2$–C$_6$H$_4$–Cl) and this led to examination of 4:4'-diamino diphenyl sulphone (H_2N–C$_6$H$_4$–SO$_2$–C$_6$H$_4$–NH_2) which has for some years been known to possess marked antibacterial activity. Its activity versus tubercle bacilli was demonstrated in 1940 by Rist *et al.* and Feldman *et al.* (1942) whilst still earlier Fourneau *et al.* (1937) showed that against streptococci in mice it was 100 times as active as sulphanilamide. Diamino diphenyl sulphone has been tested against Protozoa by Brown & Broome (1938) who found it inactive against *Trypanosoma brucei* and *Leptospira icterohaemorrhagiae*. It was found inactive by Bushland (1940) against screw-worm larvae (*Cochliomyia americana*—Diptera) and by Hawking (1940) against Filariae. Marshall *et al* (1942) tested it against *Plasmodium lophurae* (duck malaria) and found it active.

When tested in the chicken diamino diphenyl sulphone was found to be very active against the duodenal coccidium *Eimeria acervulina* and to a lesser degree also in caecal coccidiosis, due to *E. tenella*. Its activity approached but did not equal that of sulphamezathine (sulpha dimethyl pyrimidine) against these two species of coccidia.

Sulphamezathine has been found active in bovine coccidiosis but was considered at present prices possibly too expensive for widespread use in commercial stock and it was decided to use diamino diphenyl sulphone in the first outbreak of bovine coccidiosis to become available—June, 1945. By this time the compound had been used in cattle by my colleague J. Francis and it was on his dosage rates that the first doses were based. In this first outbreak the cattle were dosed orally at two rates of 0·025 and 0·05 gramme per kg. of estimated body weight (= 1·12 and 2·25 grammes per cwt.). Faeces samples were taken every other day and blood samples once daily for estimation of the blood-levels of the drug. The causal organism was *Eimeria zurnii* in each outbreak.

Outbreak 1 : (Shirley, Crewe, Cheshire)

Fifteen cattle, of which five were clinically affected. They were separated into three groups of five, containing two sick in each of groups A and B and one in group C, which was to act as a control, being treated with chlorodyne and calcium carbonate (creta prep.).

No fresh cases occurred in the six unaffected cattle in the treated groups A and B, but two out of the four unaffected animals in the control group C developed acute symptoms of the disease. All animals in the control group, at the urgent request of the owner, were then subjected to treatment as they had served their purpose as controls.

GROUP A: (Dosage 0·025 gramme per kg. per 24 hours; first dose double; seven doses given.)

Calves 1, 2 *and* 4 were normal throughout.

Calf 3 had bloody diarrhoea when first treated, which two days later had improved to "blood and mucus in the faeces"; the following day the faeces became normal. The oocyst count dropped from 50,000 per gramme to 250 and negative on the same days respectively.

Calf 5 was passing a bloody liquid containing traces of faeces when first seen (10,000 oocysts per gramme). After two days' treatment a slightly blood-tinged fluid was being passed after the faeces and on the two subsequent days purulent mucus and bloody mucus was present in the faeces. The oocyst count was 250 and 35 per gramme on the second and third days and negative on the fourth day. This was the most severe case from the clinical view and had been affected for ten days or more.

GROUP B: (Dosage 0·05 gramme per kg. per 24 hours for six days, first dose double.)

Calves 7, 8 *and* 9 remained normal throughout.

Calf 6 on the first day was passing some blood in diarrhoeic faeces, two days later there was dark brown diarrhoea and the following two days later there were slight tinges of blood in the faeces. The oocyst count was 50 per gramme the first day and negative from two days later.

Calf 10 was passing a blood-stained watery fluid which after two days' treatment was more solid but still substantially bloody; on the third day brownish faeces were being passed and there was still some straining. The oocyst count dropped from 2,000 per gramme to 10 per gramme by the second day. The continuance of symptoms was no doubt due to the temporary persistence of the lesions after destruction of the parasites.

* Received for publication August 1st. 1946.

Group C: "Untreated." (Dosed with tinct. chlorof. et morph. co. and creta prep.)

Calf 13 on the first day passed a little blood in the faeces and strained occasionally and was regarded as mildly affected. Its condition deteriorated and two days later it was passing bloody mucus and blood-tinged faeces.

The remaining calves in this group (11, 12, 14 and 15) were normal at the commencement but on the third day 14 and 15 commenced to pass blood (pure blood in the case of 14 and blood in the faeces in case 15).

In view of these two fresh cases arising among the four untreated normal cattle the owner asked for the untreated group to be put on the specific treatment, which by this time was giving good results. This was done and the three affected calves responded to the dosage used (0·05 gramme per kg.). Results summarized in Table I.

Outbreak 2

A second outbreak occurred about six weeks later (July 5th, 1945) on the same farm but involving another bunch of cattle weighing from 4 to 5 cwt. Results summarized in Table II.

They were treated with 0·05 gramme diamino diphenyl sulphone per kg. (= 0·5 dram per cwt.) once in every 24 hours, the first dose always being double (seven doses).

Calf 1 was passing purulent mucus and blood containing very many oocysts in direct smears. The first day following treatment the oocyst count was 25,000 per gramme which fell on the second day to 50. On the third day a bloody liquid containing whitish mucus was being passed which gave place the following day to clear liquid slightly blood-tinged faeces with whitish mucus.

Calf 2 was affected with a brownish diarrhoea (indicative of containing blood) and was passing some blood and mucus after the faeces; the oocyst count was 700 per gramme rising to 5,000 on the day after treatment began. On the second day blood and fluid and some mucus was being passed and the oocyst count had fallen to 150. On the third day the faeces were blood-tinged and on the next still rather fluid and slightly brownish.

Calf 3 was passing brownish diarrhoea with slight terminal blood with a coccidia count of 600 per gramme before treatment. On the next day (as also with 1 and 2) the count rose to 5,500. On the second day the faeces were brownish (due to incorporated blood) and oocysts fell to 150. On the third day there was blood-streaked mucus with the faeces and the following day the fluid faeces showed a mere odd fleck of blood. On those days coccidia were not found.

In this outbreak these three cases were apparently treated just before the peak of infection had been reached as seen by the increase in the coccidial count and severity of symptoms (especially case 2).

Calves 4, 5 *and* 6 remained normal with low or negative oocyst counts, but were treated.

Calves 7 *to* 12 were kept untreated for a few days as controls and in calf 7 the oocyst count was 200 and 250 on the day of the first visit and first day after; it had slight diarrhoea for two days and may or may not have been slightly affected. The remaining five calves in the untreated group remained substantially normal.

The minimum blood-levels of the drug maintained during treatment were estimated from blood samples taken every day immediately before dosing (approximately 24 hours after the previous dose). The blood-levels are expressed in mg. drug per 100 c.cm. and were determined by the method of Rose & Bevan (1944).

In the first outbreak the clinical response to treatment by the higher dosage 0·05 gramme per kg. was considered sharper than to 0·025 gramme per kg., although that was complete and was also better than in the second outbreak, where lower blood-levels of the drug were found—possibly the weight of the cattle was misjudged. The conclusion reached was that a minimum level of the drug in the blood of from 3 to 4 mg. was probably adequate.

As the weights of the treated calves had been estimated after inspection only, there was possibility of error and the dosing of cattle of known weight was undertaken at the laboratory with various dosages to ascertain the actual dosage rate required in calves of known weight to maintain adequate blood-levels of the drug.

At 0·04 gramme per kg. every 24 hours (weighed calves) the average minimum blood-levels before subsequent treatments were 3·3 mg. per 100 c.c. and this dosage is considered suitable.

0·02 gramme and 0·03 gramme per kg. every 24 hours in weighed calves gave average minimum levels of 1·8 and 2·2 mg. per 100 c.c. In all cases a double "loading" dose was given on the first day, followed daily by the dosage indicated.

Outbreak 3: (Blackwell, Exmouth)

In this outbreak one animal had died from coccidiosis (*post-mortem* examination by Mr C. V. Watkins, Veterinary Investigation Officer for S.W. Counties) and several were very severely affected, with expectation of further deaths when first seen (July 18th, 1945). The causal organism was *E. zurnii* accompanied in some cases by small numbers of a larger coccidium, probably *E. bovis*.

In considering each animal's history they will be dealt with in the various dosage groups:—

(*a*) Dosage of 0·04 gramme per kg. per 24 hours; first dose not double; six doses.

Calf 1 had been affected three days earlier passing blood with severe tenesmus; on the day of treatment it showed profuse diarrhoea proceeding to diarrhoea on the second day, and normal faeces on the fourth day after treatment. The oocyst count ranged from 140 before treatment to 30 and 15 (large species) and negative, second, fourth and sixth days after treatment.

Calf 2 was passing normal faeces and oocysts fell from 150 before treatment to negative on second and subsequent days. This was not a clinical case at any time.

Calf 3 had passed blood three days before being first seen by me when it was affected with diarrhoea which was succeeded two and four days after treatment by slight diarrhoea and normal faeces. The oocyst count fell from 360 to nil after treatment. A mild case.

Calf 5: affected fully six days before seen by me and passing much blood with great tenesmus. When seen on the day of treatment much blood and mucus were being passed with an oocyst count of 4,500 grammes which fell to 600 on the second day after treatment and 45 (large species) on the fourth day with subsequent negative counts. The blood and mucus improved by the second and fourth days to "severe diarrhoea with blood and mucus" and to profuse diarrhoea whilst on the fifth day there was slight diarrhoea and next day normal faeces. This was a severe case. (Weight may have been underestimated and calf under-dosed.)

(*b*) Dosage of 0·04 gramme per kg. per 24 hours; first dose double; six doses.

Calf 7 showed diarrhoea followed by normal faeces with negative oocyst counts.

Calf 8: faeces normal and oocyst count of 60 grammes followed by negative counts.

Neither 7 nor 8 was clinically affected.

(*c*) Dosage of 0·08 gramme per kg. per 48 hours; first dose × $1\frac{1}{2}$ = 0·12 gramme per kg.

Calf 9 was affected with diarrhoea but faeces became normal by the second day. The count of 200 oocysts per gramme fell to 30 on second day with subsequent negative counts. Not a clinical case; dosed twice only.

Calf 10 showed profuse diarrhoea and tenesmus before treatment and on second day after treatment slight blood in clear mucus passed after the faeces; and on subsequent days normal faeces. Oocyst count fell from 150 per gramme before treatment to 30 on second day and negative counts subsequent days. This was a definite clinical case and was given four doses at 48-hour intervals.

(*d*) Dosage of 0·08 gramme per kg. per 48 hours; first dose double; three doses each.

Calf 4 showed blood and mucus when first seen and two days later (still before treatment) severe diarrhoea with blood and mucus. One day after treatment profuse diarrhoea followed next day by diarrhoea and the day following by normal faeces. Next (fourth after treatment) there was slight diarrhoea with a trace of blood and next day slight diarrhoea. Before treatment oocyst counts of 1,000 and 600 per gramme (latter mainly large species) were found and one day after treatment a count of 50 per gramme and two days later a negative count followed by 30 per gramme (large species) on the last day observed. This larger coccidium (probably *E. bovis*) was not so completely eliminated by treatment and may have been responsible for the slight recrudescence of symptoms during treatment.

Calf 6 showed diarrhoea, and diarrhoea and some blood, on the third and last days before treatment. The day after treatment there was diarrhoea with a trace of blood and mucus, two days later diarrhoea followed by normal faeces on subsequent days. Oocyst counts before treatment were negative and 15 per gramme (large species) on the day after treatment with subsequent negative results.

(*e*) Dosage of 0·16 gramme per kg. per 48 hours; three doses.

Calf "Tiny." Faeces normal day before treatment followed by slight diarrhoea on day after first dose faeces remaining

(*Text continued on page* 27)

TABLE I*

OOCYST COUNTS PER GM. FAECES OF AFFECTED CATTLE IN RELATION TO TREATMENT

	Animal No.	Weight Lb.	Days before				Days after									
			2nd		1st		1st		2nd		3rd		4th		5th	
			Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces
0·025 gm. per kg. (estimated) every 24 hours	3	550	—	—	50,000	Bloody diarrhoea	—	—	250	Bloody mucus	—	Normal	—	—	—	—
	5	550	—	—	10,000	Bloody liquid	—	—	260	Slightly B.T.F. after N faeces	35	Watery M. after faeces	—	Bloody mucus	—	Normal
	6	450	—	—	50	—	—	—	—	Dark brown D	—	B.T.F.	—	B.T.F.	—	Normal
0·05 gm. per kg. every 24 hours	10	450	—	—	2,000	Blood diluted	—	—	10	B	—	Slight B.T.F.	—	Slight B.T.F.	—	Normal
	13	400	—	Traces blood	—	Bloody mucus	—	B.T.F.	—	Slightly B.T.F.	—	Normal	—	—	—	—
	14	500	50	Normal	—	Normal	250	Pure blood	—	B.T.F.	—	Normal	—	—	—	—
	15	400	—	Normal	10	Normal	—	Bloody mucus	—	Normal	—	Normal	—	—	—	—

TABLE II

No.	Before treatment		After Treatment											
			1st day		2nd day		3rd day		4th day		5th day		6th day	
	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	
1	Very many	Purulent mucus and blood. No faeces	25,000	—	50	Brownish diarrhoea	70	Bloody liquid and whitish mucus	0	Clear liquid slightly blood tinged mucus	0	Normal	0	
2	700	Brownish diarrhoea some blood and mucus at end	5,000	—	20	Blood and fluid and some mucus	0	Blood tinged faeces	30	Rather fluid and brownish	10	Normal	0	
3	600	Ditto	5,000	—	150	Brownish faeces	0	Blood streaked mucus and soft faeces	60	Fluid with flecks of blood	10	Considerable mucus. No blood	10	
4	0	None	60	—	30	Normal	0	—	20	Normal	0	Normal	10	
5	0	None	15	—	60	Normal	0	—	0	Normal	0	Normal	0	
6	0	None	0	—	40	Normal	0	—	0	Normal	10	Normal	0	

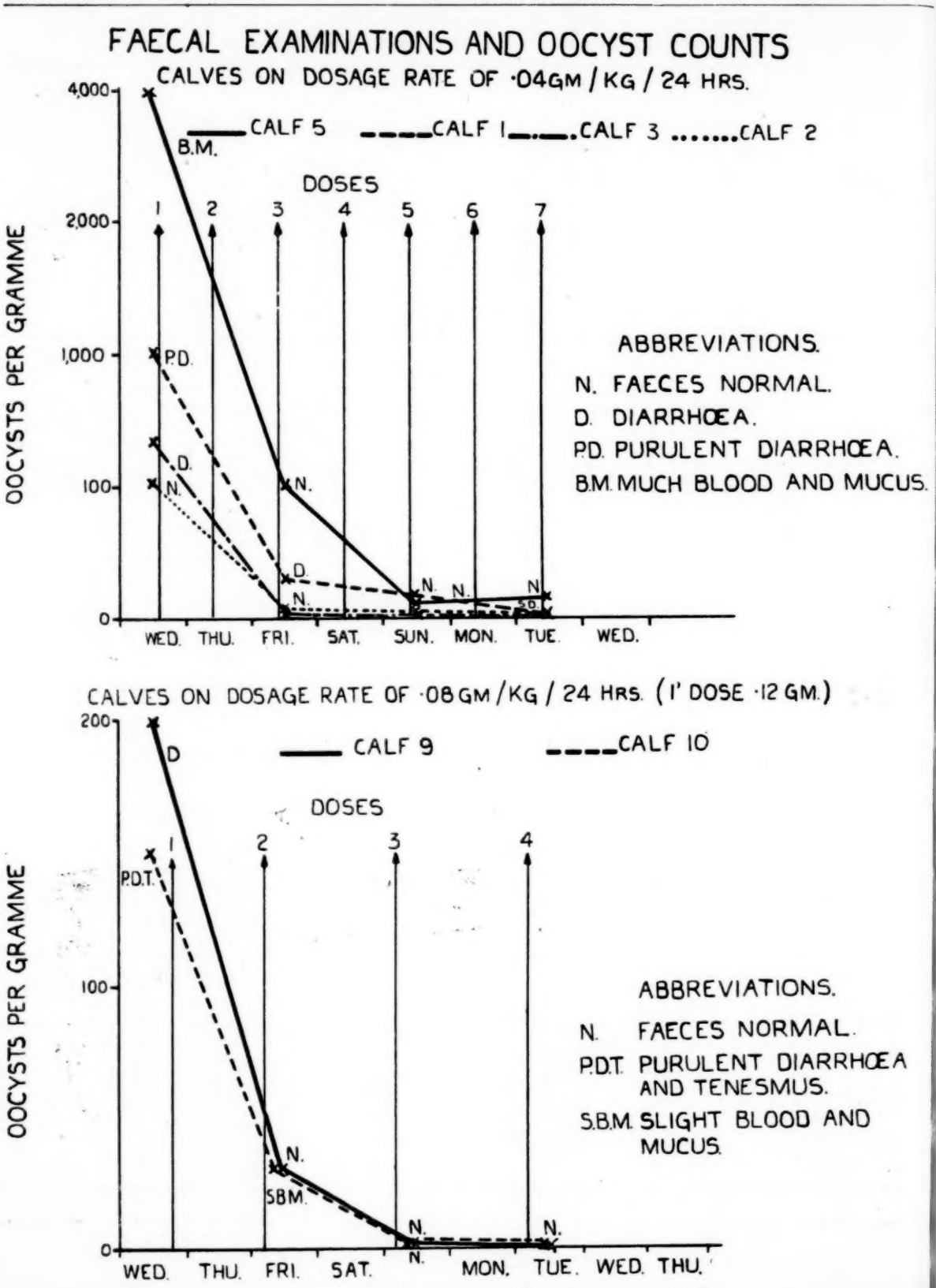
TABLE III

Animal No.	Dose	Day before treatment		Days after treatment											
				2nd		4th		5th		6th		7th		8th	
		Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces
1	0·04 gm. per kg. every 24 hours	140	P.D.	30	D.	15(L.)	N.	—	—	0	—	—	—	—	—
2		150	N.	0	N.	0	N.	—	—	0	N.	—	—	—	—
3		360	D.	0	Slight D.	0	N.	—	—	0	N.	—	—	—	—
5	0·04 gm per kg.	4,500	Much	100	N.	10(L.)	N.	—	—	—	N.	—	—	—	—
7		0	D.	0	N.	0	N.	—	—	0	N.	—	—	—	—
8		60	N.	0	N.	0	N.	—	—	0	N.	—	—	—	—
9	0·08 gm. per kg. every 48 hours 1st dose 0·12 gm.	200	D.	30	N.	0	N.	—	—	0	N.	—	—	—	—
10		150	P.D. T.	30	Diarrhoea Slight B in clear mucus	0	N.	—	—	0	N.	—	—	—	—

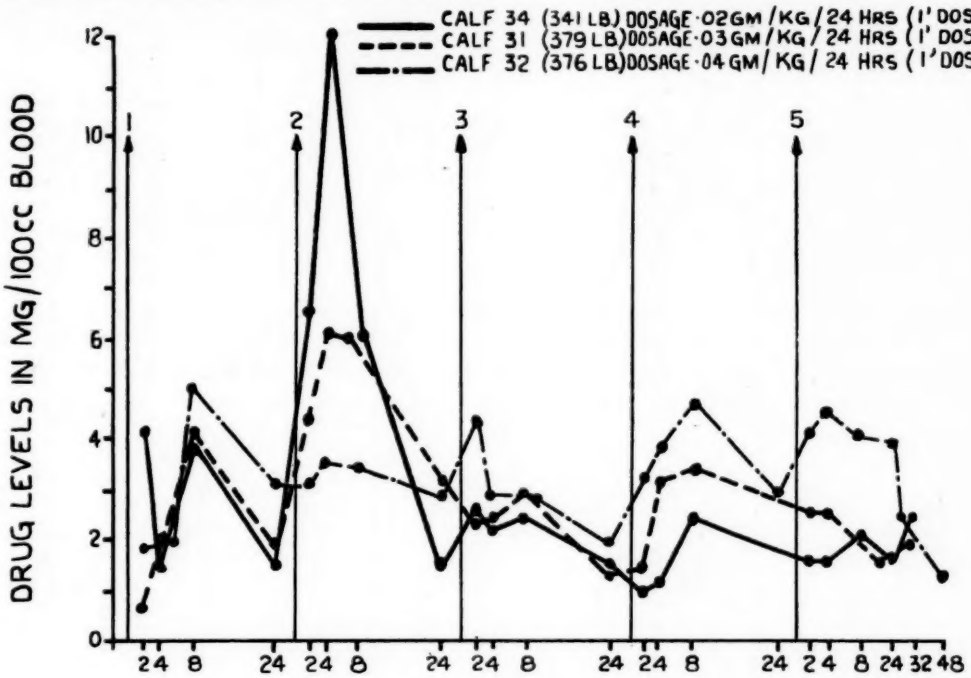
TABLE IV

Animal No.	Dose	Before treatment				After treatment									
		3rd day before		1 day before		1st day		2nd day		3rd day		4th day		5th day	
		Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces	Oocysts	Faeces
4	0·08 gm. per kg. every 48 hours—1st dose 0·16 gm.	1,000	B. & M.	600	Severe D.B. and M.	45(L.)	P.D.	—	D.	0	N.	30(L.)	D and traces of B.	0	Slight diarrhoea
6	0·08 gm. per kg. every 48 hours—1st dose 0·16 mg.	0	D.	0	D. and slight B.	15(L.)	D. trace B. & M.	—	—	—	D.	—	N.	—	N.
Tiny	0·12 gm./48 hrs. for 3 doses	—	—	0	—	0	Slight D.	—	N.	0	N.	15(L.)	—	0	N.

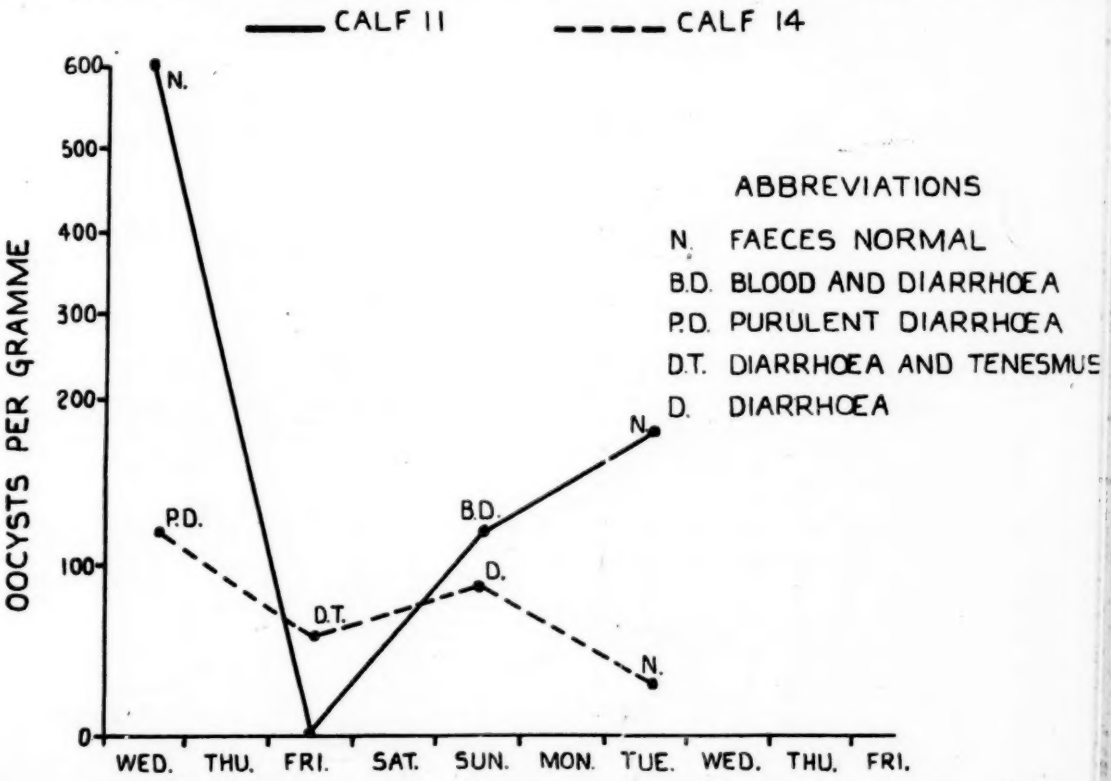
* Abbreviations used in tables: B. = Blood; D. = Diarrhoea; P.D. = Profuse diarrhoea; M. = Mucus; N. = Normal; L. = Large; B.T.F. = Blood tinged fluid


FAECAL EXAMINATIONS AND OOCYST COUNTS
CALVES ON DOSAGE RATE OF ·04GM / KG / 24 HRS.
CALF 5
CALF 1
CALF 3
CALF 2
B.M.
DOSES
1
2
3
4
5
6
7
OOCYSTS PER GRAMME
4,000
2,000
1,000
100
0
P.D.
D.
N.
ABBREVIATIONS.
N. FAECES NORMAL.
D. DIARRHŒA.
P.D. PURULENT DIARRHŒA.
B.M. MUCH BLOOD AND MUCUS.
WED.
THU.
FRI.
SAT.
SUN.
MON.
TUE.
WED.
CALVES ON DOSAGE RATE OF ·08 GM / KG / 24 HRS. (1' DOSE ·12 GM.)
CALF 9
CALF 10
DOSES
1
2
3
4
OOCYSTS PER GRAMME
200
100
0
D
P.D.T.
N.
S.B.M.
ABBREVIATIONS.
N. FAECES NORMAL.
P.D.T. PURULENT DIARRHŒA AND TENESMUS.
S.B.M. SLIGHT BLOOD AND MUCUS.
WED.
THU.
FRI.
SAT.
MON.
TUE.
WED.
THU.

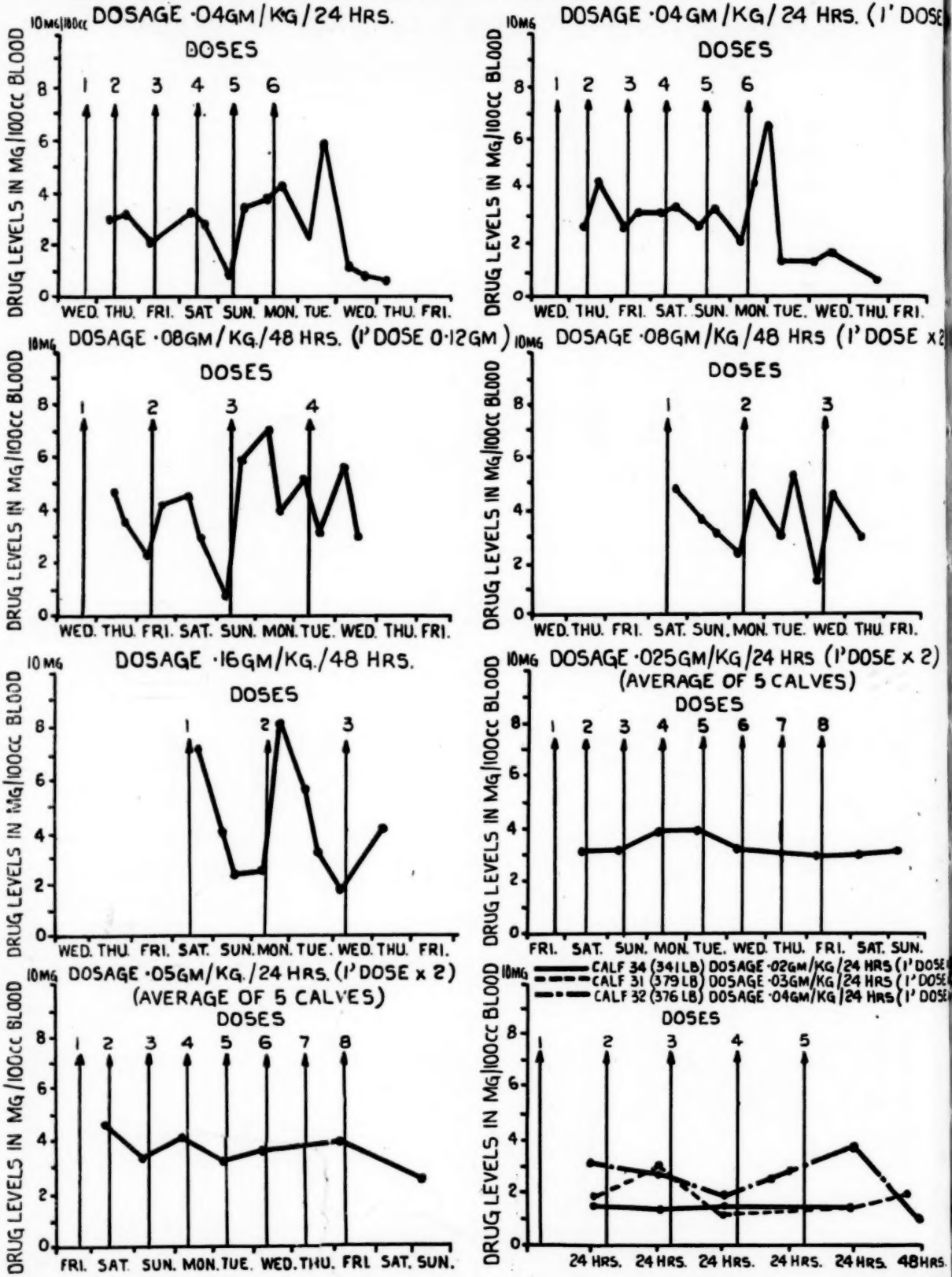
BLOOD LEVELS IN CALVES OF KNOWN WEIGHT



FAECAL EXAMINATIONS AND OOCYST COUNT OF UNTREATED CALVES



Minimal Blood Levels of Sulphone in Calves Under Treatment (Weights Estimated) Compared with Levels of Known Weight


DOSAGE ·04GM/KG/24 HRS.
DOSES
DRUG LEVELS IN MG/100CC BLOOD
WED. THU. FRI. SAT. SUN. MON. TUE. WED. THU. FRI.
DOSAGE ·04GM/KG/24 HRS. (1' DOSE
DOSAGE ·08GM/KG./48 HRS. (1' DOSE 0·12GM)
DOSAGE ·08GM/KG/48 HRS (1' DOSE x2
DOSAGE ·16GM/KG./48 HRS.
DOSAGE ·025GM/KG/24 HRS (1' DOSE x 2)
(AVERAGE OF 5 CALVES)
FRI. SAT. SUN. MON. TUE. WED. THU. FRI. SAT. SUN.
DOSAGE ·05GM/KG./24 HRS. (1' DOSE x 2)
CALF 34 (341 LB) DOSAGE ·02GM/KG/24 HRS (1' DOSE
CALF 31 (379 LB) DOSAGE ·03GM/KG/24 HRS (1' DOSE
CALF 32 (376 LB) DOSAGE ·04GM/KG/24 HRS (1' DOSE
24 HRS. 24 HRS. 24 HRS. 24 HRS. 24 HRS. 48 HRS.

normal subsequently. Coccidia were absent except on fourth day after treatment, when 15 per gramme of the large species were found. It is quite possible that in several cases where slight diarrhoea was recorded after apparently successful treatment of *E. zurnii* that it may have been associated with the low counts of the larger ovoid coccidium (*E. bovis*) which was seen on the second to fourth days before the diarrhoea was observed (cases 4 and 6 treated).

Outbreak 4: (Morgan, Exeter)

Case 1. Had been ill eleven days and treated with large doses of ipecacuanha. It was extremely emaciated, straining and passing clear mucus, blood clots or foetid watery faeces alternately. On the day after treatment there was profuse diarrhoea and two days later more moderate diarrhoea with normal faeces on the three days following. No oocysts were seen in a sample taken on the day of treatment, two days later 300 per gramme were seen with subsequently negative counts on the fourth and sixth days after treatment. Six doses given.

Case 2. Showed diarrhoea and negative faeces at time of treatment, followed two days later by normal faeces and 30 per gramme, a negative count on the fourth day and 90 per gramme on sixth day after treatment began (= third day after dosing ceased). Two doses only given.

Case 3. Was a mild case left untreated. On first and third days of observation it showed diarrhoea and slight diarrhoea with some blood followed by normal faeces. Oocyst counts of 0, 90, 0 and 120 per gramme were recorded for first, third, fifth and seventh days of observation.

DISCUSSION

The course of the disease depends greatly on the degree and length of exposure to infection but the symptoms in acute cases are distinctive; they are diarrhoea, which may be profuse and sometimes foetid, accompanied by tenesmus and liquid abdominal sounds which are a marked symptom in most cases, though not specifically entered in the case records here given. Most severe cases grind their teeth constantly. Clear mucus, blood, or blood and mucus may be passed with, or after, the faeces or sometimes what appears to be a bloody liquid or diluted blood is passed in copious quantities.

With recovery the mucus becomes whitish, the blood is reduced in amount and the faeces may be brownish (due to incorporated blood), becoming greener as improvement continues and the mucus becomes water clear with or without flecks of blood. The faeces become more solid and straining gradually becomes less. The oocyst counts are very variable and symptoms have been observed in cases with quite low counts. Haemorrhage often occurs before oocysts appear in the faeces and is no doubt associated with the intracellular schizogonic multiplication of the parasite as in *E. tenella* infection of the caeca in chickens.

During treatment *E. zurnii* disappears before the other larger species (*E. bovis*). The disease appears to be associated with *E. zurnii* principally, though mild symptoms may be associated with the other coccidium during the successful treatment of *E. zurnii* infections.

Ipecacuanha is often used in the treatment of coccidiosis on account of a lightly drawn comparison with the *Entamoeba* of human dysentery which responds to emetine (ex. ipecacuanha). Ipecacuanha and other amoebicides have been tested in chickens infected with *E. acervulina* and have shown no signs of activity, just as in bovine case 1 in outbreak 4. Examination of the blood-levels of diamino diphenyl sulphone in successfully treated calves shows minimum levels of 2 to 3 mg. per 100 c.c. to be satisfactory and from dosing of calves of known weight it has been ascertained that a suitable dosage to attain this level is 0·03 to 0·04 gramme per kg. (= 0·37 to 0·5 dram per cwt.) given once in every 24 hours (first dose double). The higher dosage rate is preferred. It is advisable to treat all the cattle in the bunch exposed to infection.

Summary

(1) 4:4′-diamino diphenyl sulphone is effective in the treatment of bovine coccidiosis due to *E. zurnii*.

(2) Dosage may be at the rate of 0·04 gramme per kg. per 24 hours (0·5 dram per cwt.) or 0·08 gramme per kg. per 48 hours (1 dram per cwt.). In either case the first (loading) dose should be double.

(3) Treatment should last six days—six doses or three doses according to the dosage routine chosen.

Acknowledgments.—I am grateful to the following veterinary surgeons for kindly allowing me access to the outbreaks described: G. N. Shirley, B.V.SC. (LIV.), N.D.P., M.R.C.V.S., Crewe; W. G. Blackwell, M.R.C.V.S., Exmouth; K. G. Morgan, M.R.C.V.S., Exeter; and also to C. V. Watkins, D.V.S.M., M.R.C.V.S., Veterinary Investigation Officer for the South-Western Counties.

I am also indebted to Mrs. J. Cross, B.SC., Miss H. G. Forster and Miss J. Lonsdale for their technical assistance in the laboratory.

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Application of 'Gammexane' to Arthropods of Veterinary Importance*

by

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Since the announcement by Slade[1] of the discovery of 'Gammexane,' several references have been made in the Press to its use in the control of pests of animals. As a considerable amount of work on this subject is being done in our own laboratories and by independent collaborators, it is felt that a brief résumé of the results so far achieved will be of interest. In this communication, 'Gammexane' refers to the gamma (γ) isomer of benzene hexachloride, and references to other authors' work are interpreted in terms of the gamma isomer so far as that is possible. The experimental preparation used was (except where otherwise stated) a dilution in water prepared from a five per cent. solution of 'Gammexane' in a mixture of sulphonated castor oil and an organic solvent in proportions to give an easily pourable, miscible oil.

Diptera. The value of 'Gammexane' for the control of flies generally has been widely recognized. Against the sheep blowfly (*Lucilia* spp.), Harbour and Watt[2] found that good protection up to six weeks was obtained using a spray containing 0·5 per cent. 'Gammexane.'

We have found that a spray deposit of approximately 40 mgm./sq. ft. produced lethal effects on the adult stable fly (*Stomoxys*), the residual activity lasting up to three weeks. With the sheep ked (*Melophagus ovinus*) this residual activity persists in long-woolled sheep for a similar period after treatment with dilutions of one in 25,000. The larvae of *Hypoderma* in the back of infested cattle and *Gastrophilus in vitro* are relatively insusceptible. Excellent results have been reported on the treatment of wounds infested with the screw worm (*Cochliomyia hominivorax*), and the application of 'Gammexane' to open wounds was found harmless.

Against the orthorrhaphous Diptera, 'Gammexane' shows a high degree of activity, producing complete mortality of the aquatic larvae of *Culicoides nubeculosus* after 24 hours contact with a concentration so low as 1 in 5,000,000; while *Simulium* larvae succumbed to even greater dilutions (1 in 8,000,000) after an exposure of one hour followed by a change of water.

Anoplura. Both biting and sucking lice are highly susceptible to 'Gammexane' either as dusts or emulsions. Dilutions up to 1 in 15,000-30,000 in single applications give complete control of *Bovicola bovis*. With *H. eurysternus* somewhat higher concentrations were necessary, probably because these lice are found in places where the hair is short and sparse. The pig louse (*H. suis*) was destroyed by a single application of castor oil—spirit lotion (equal parts by weight) containing 1 in 20,000 'Gammexane', which remained effective up to at least 27 days. *Trichodectes canis* and *Linognathus setosus* were eradicated from dogs bathed with 'Gammexane' emulsions as dilute as 1 in 40,000.

Siphonaptera. One application of 0·5 per cent. 'Gammexane' dust has been generally found to rid dogs and cats of fleas and prevent reinfestation for some time. The breeding places of fleas require treatment as well as the infested animals. As a bath for infested animals, dilutions of up to 1 in 15,000 were effective.

Acarina. 'Gammexane' has proved effective against several genera of ticks (*Argas, Ornithodorus, Boophilus*). Hocking[3] eradicated *Ornithodorus moubata* from barrack huts by spraying the

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floor twice at intervals of three weeks (150 mgm./sq. ft.). Whitnall[4] has found that complete inhibition of egg laying of *Boophilus decoloratus* is obtained by 0·008 per cent., whereas for the same effect the concentrations of arsenic trioxide and D.D.T. require to be 0·32 per cent. (as sodium arsenite in water) and 4 per cent. respectively. The arsenic-resistant tick was found highly susceptible to 'Gammexane'. Taylor[5] found two applications of 0·1 per cent. 'Gammexane' in liquid paraffin more effective in rat mange (*Notoedres muris*) than D.D.T. In these laboratories the same infection has been cured by dipping affected rats once for 30 seconds in dilutions so high as 0·01 per cent. Single-spray treatment of chorioptic mange of horses (legs) and cattle (neck and rump) has resulted in destruction of most of the acari and great clinical improvement for several weeks. Complete cure may have been obtained by single sprayings of 1 in 6-8,000 'Gammexane' dilutions.†

Exact data on *Sarcoptes* spp. are not available, though promising results have been reported.

Dermanyssus gallinae (red mite) has been considerably reduced by sprays of 1 in 5,000, and heavy infestations almost eliminated from hen houses sprayed with a 1 in 2,500 dilution. Elimination has been claimed by the use of 0·5 per cent. dusts on perches and other harbourages combined with dusting of the birds.

Among the synthetic insecticides, 'Gammexane' is outstanding in acaricidal activity, and this important veterinary use is being investigated further. A fuller account of the results obtained is being prepared for publication.

(1) Slade, R., *Chemistry and Industry*. 314. (Oct. 13th, 1945.)
(2) Harbour, J. E., & Watt, J. A., *Vet. Rec.* 52. 685. (1945.)
(3) Hocking, K. S., *E. African Med. J.* 23. 50. (1946.)
(4) Whitnall, A. B. M., Private communication. (1945-46.)
(5) Taylor, E. L., *Vet. Rec.* 57. 210. (1945.)

† Subsequent examinations indicate that for single treatment cure of chorioptic mange in horses higher concentrations will be necessary.—J. S. S.

MINISTRY OF AGRICULTURE NEWS SERVICE

Export of Breeding Stock to Europe.—In reply to a question put to him by Sir John Barlow in the House of Commons on December 16th, the Minister of Agriculture indicated that it has now been found possible to consider more favourably the export of breeding stock to the Continent of Europe.

The question and reply dealt primarily with poultry and breeders can now expect to receive licences in appropriate cases permitting the export of stock poultry, young chicks and hatching eggs. The Minister also said that applications for export licences can now be more freely granted in respect of pedigree cattle, sheep and pigs. It is intended to grant export licences in future equally for male and for female pedigree breeding stock. The export of cows and heifers, and sows and gilts to Europe has recently been restricted because increases in numbers of young stock would have tended to intensify the difficulties that European countries were experiencing in providing enough grain for human consumption.

Export licences will not be granted to an extent which would jeopardize the re-establishment of our own flocks and herds and the future production of milk, meat and eggs.

* * * * *

Cool Milk all the Year Round.—Dirty churns and utensils, exposure to sun for long periods—these as milk producers know are among the main causes of souring of milk. During the winter there is not much danger of milk souring through exposure to sun, yet in some districts there is nearly as high a percentage of category "C" milk in December as there is in June. In winter, when milk does not come up to keeping standard, the cause can usually be traced to failure to cool, and to dirty utensils.

The occasional spells of really mild weather that are sometimes experienced in winter months greatly favour the rapid growth of souring organisms, particularly if the milk is uncooled and placed in churns, where it falls to atmospheric temperature at a slow rate. Milk producers are, therefore, urged to continue the routine cooling of milk throughout the winter, both in the morning and in the evening, and to cleanse and sterilize milk production equipment all the year round.

Experience has also shown that the dangers of souring by dust, flies and hot weather, typical of summer months, are replaced during the winter by the longer housing of cows, delays in transport due to weather conditions and the shorter days.

Weekly Wisdom

"Far too many clinicians are 'syringe-happy.'"—President Farquharson, of the American V.M.A.

THE VETERINARY RECORD
January 18th, 1947

CANINE HYSTERIA

Mellanby (1946) has recorded the experimental production of a syndrome of "hysteria" in dogs by a diet containing flour subjected to improving procedures, notably one involving exposure to nitrogen trichloride—the "agene" process. It is suggested this process affects the wheat protein converting it into a toxic product. If these observations are substantiated their implications in human nutrition are very important as has been stressed by the *British Medical Journal* (Editorial). In addition, however, they throw further light on a disease problem in dogs which has been a bane to the veterinarian for years, and which has provoked interminable discussion on nature and cause, which until recently has been more chimerical than the result of careful observation and scientific study.

The term *hysteria* in human medicine (originally derived from the ancient belief that it was connected with uterine disease) denotes a neurosis characterized by mental dissociation, leading in severe cases to multiple personality and amnesia but more often to somatic symptoms such as convulsions, paralysis and sensory disturbances *without organic disease* (see Russell Brain, 1940). It is difficult to trace the history of how, and when, such a concept became applied to a canine condition; there are few references to canine hysteria before 1920. Hobday (1906), for example, deals with the condition in a few lines under diseases of the *female genital organs*. It is impossible to mention all the papers which have appeared since; they are given in those by Hobday *et al.* (1929, 1930), Chambers (1929), and Hewetson (1936). The disease may have been seen first in this country or in the U.S.A. about 1920, and has been called by many names, including "hysteria," "fright disease," and "running fits."

Clinically, there is a general state of nervous apprehension enlivened by outbreaks of motor activity, in the form of convulsions or of periods of running and barking during which the dog fails to respond to normal controls. The disease occurs at any age, in both sexes, and the suggestion that the pedigree dog is more susceptible does not now harmonize with known facts. The attacks may be repeated the same day, or at intervals of days or even weeks, and many dogs in a kennel may be affected at the same time, or an attack by one dog may be followed by others. There seems to be a delicate trigger mechanism requiring only the slightest stimulus of some external noxa to provoke an attack. This sums up very briefly the condition which is so well known to practitioners in this country, and in North America. There have been casual comments by a number of observers that there are no pathological changes in the brain. In such a functional disorder this may be true but it must be mentioned that these observations have been mostly based on the absence of macroscopic changes — a notoriously unreliable criterion. There has been no study using modern neuropathological techniques (see Innes, 1940).

Theories regarding causation have been legion, often undoubtedly original but unsubstantial and illusory; "toxaemia," phytotoxins, moulds in biscuits, parasites in the ear, some unidentifiable infection, the distemper virus, intestinal worms, teething troubles, in-breeding, and even the shape of the skull have all had their protagonists. Vague unspecified dietary factors were suggested many

years ago, particularly in connection with the use of dog biscuits.

Clinical observations gradually established that the disease was associated with the feeding of biscuits and baked dog foods, occasional batches of which would cause an outbreak within two or three days of their use. The idea that the dietary factor was perhaps in the nature of a vitamin was another suggestion (see Patton, 1939; Morgan, 1940; and Walston, 1933), the last postulating that it might be due to vitamin A deficiency coupled with an "E-substance" occurring in dog biscuits and cereals. Hancock (1941) showed experimentally that a biscuit made from flour from certain sources induced hysteria in nine out of eleven experimental dogs in 52 to 200 hours after the animals were given the diet; he concluded it was due to a pollen or seed contaminant of inferior quality grain. The stage was thus set for a further act; in 1939 Arnold & Elvehjem found that a baked dog food of wheat flour and meat scraps caused fits in dogs and thought that a lysine deficiency was involved. However, these cereal products of varying composition could not be relied upon to set up the disease regularly; many trials had been complete failures, or the disease remained extremely fickle in its occurrence, only an odd dog in batches being affected. Little progress was possible until the syndrome could be produced with purified diets of known composition.

This was accomplished in 1940 by Parry (quoted by Mellanby, and Wagner & Elvehjem, 1944 and 1946), working in Elvehjem's laboratory, who produced an hysterical syndrome in dogs using highly purified diets containing adequate amounts of all known dietary constituents but in which the protein was wheat gluten. The "hysteria" could be produced with great rapidity and intensity; the similarity of the symptom-complexes to those in the natural disease, and the fact that wheat protein was a frequent ingredient of baked dog foods, led Parry to conclude that the disease was the same in both cases. This work was continued by Wagner & Elvehjem (1944) who confirmed Parry's results, and also showed that the disease was not produced in the chick, rat, guinea-pig, and monkey by feeding rations containing a large amount of wheat gluten for periods of three weeks or more. The hysteria was not related to the pyridoxine deficiency fits of pigs and rats produced by Chick *et al.* (1938 and 1940) [these fits were considered to resemble typical epilepsy as seen in the human being, and were not thought to be "obviously very similar to hysteria in dogs," as stated in the Editorial of the *British Medical Journal*]. The mechanism by which a staple food such as wheat can become toxic remains now to be determined, but the observations of Mellanby provide a new approach.

The subject of animal neurology and the exact nature of hysteria could be discussed from many other angles with great profit. There is no doubt that the term "hysteria" has been very loosely used to denote a clinical entity which is confused with many others. Without too much emphasis being laid on classification a closer approach to the techniques adopted by the medical neurologist and neuropathologist is certainly required, otherwise such confusion will continue. The difficulty of accurate neurological diagnosis in animals is great simply because symptoms can only be objective in character; apart from a greater armamentorium of diagnostic aids medical workers obtain much analytical information from observations on the effect of nervous dysfunction on speech, hearing, sight and sensation. We still require data which will enable us to correlate functional disorders of the nervous system with structural alteration (if there is any), and it is quite obvious that in the animal this is by no means an easy matter. The term hysteria applied to the canine condition has no relation to the human disease, nor has it been recognized in any other species. In the dog its clear recognition depends upon the appraisal of clinical signs which are largely confined to the nervous system—changes of behaviour with the occasional motor outbursts. The analysis of the former is notoriously difficult while motor outbursts of a similar character might arise from several different origins. "Hysteria" must thus be clearly distinguished from the convulsions and motor disorders seen in epilepsy (if this indeed occurs in dogs), in so-called post-distemper encephalomyelitis (with or without meningitis), in other canine encephalopathies, in non-specific meningitis, in seizures associated with teething in puppies, and in the transient irritation phenomena shown by some dogs with parasites or foreign bodies, in the external auditory meatus. Similar hysterical outbursts have also been seen in unmistakable cases of florid rickets. Accurate diagnosis must often thus be a matter of great difficulty to clinicians with long experience of the dog and even to those who have a particular knowledge of neurophysiology. It is therefore of cardinal importance that experimental studies on nervous diseases in dogs in general and hysteria in particular should be carried out with these facts clearly appreciated and under conditions in which such disorders are rigorously excluded.

This work of Mellanby and of Wagner & Elvehjem is of great importance, but it may be noted that veterinary research workers have in fact made a considerable contribution leading up to the discovery, first of all in the clinical field of direct observation, and later in the experimental work of Parry. There is still a great deal to be done because we know literally nothing of the neural mechanism which causes such dysfunction of the higher nervous system. There is thus still room for bearing in mind the aphorism of that great English neurologist, Hughlings Jackson:

"The Study of Things caused must precede the Study of the Causes of Things."

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A catalogue of films of general scientific interest available in Great Britain, compiled by the Scientific Film Association, has been published recently by Aslib (Association of Special Libraries and Information Bureaux), 52, Bloomsbury Street, London, W.C.1. The price is 5s. from the Scientific Film Association, 34, Soho Square, London, W.1. This is the first catalogue to be compiled by the S.F.A. The films listed are of general scientific interest, ranging from films of technique and process to those relating science to society.

CONTROL OF RATS AND MICE

"The immense importance of rats and mice as carriers of disease and destroyers of food is perhaps not sufficiently realized in this country," states *The Lancet* in a recent annotation, which continues: "*Rattus rattus*, the 'black' or 'ship' rat, was the earliest invader of Europe, coming from the East shortly after the Crusades, probably by ship. This settler spread rapidly, but was eventually almost entirely replaced by *Rattus norvegicus*, the larger, short-nosed, short-tailed common brown rat, as a result of a strange revolution in the rat world which took place towards the end of the 17th century. Professor G. M. Trevelyan claims this change-over was the chief cause of the decline of the plague of 1665, because the brown rat did not carry the plague-flea to nearly the same extent as its predecessor. It is certain that between them they have been responsible for an incalculable number of deaths from plague and typhus, and also for the spread of such infections as rat-bite fever and Weil's disease. The 40,000,000 rats in England at present are chiefly a nuisance because of the large amounts of human food which they eat or damage.

"A pamphlet[1] prepared by Mr. S. A. Barnett for the Ministry of Food stresses the need for a systematic search for rats or mice before any attempt is made to exterminate them. The brown rat follows man in both town and country, living in sewers, factories and warehouses, and burrowing under hedge-banks and ricks. The black rat, an active climber, is confined mainly to ships and dockyard areas, but is also found inland. The house mouse (*Mus musculus*) adapts itself less well, and usually nests as near as possible to the source of food. In tackling an infested area the nesting sites must be found, then the feeding places, and finally the runs between the two. Evidence of the last is given by smears left on floors and beams, by droppings, by holes in walls and tooth-marks on metal (rats can, and do, gnaw through lead pipes half an inch thick); also by footmarks, damage to sacks, and disappearance of food. When a rough idea of the size of the infested area has been gained, a sketch map is drawn, and plain bait is laid along the known runs. It may take several days before the bait is accepted: then the poison is added. The bases recommended are damp sausage rusk, sugar meal, bread mash, and soaked wheat. Zinc phosphide 1 in 40, arsenious oxide 10 per cent., red squill powder 10 per cent., and 'Antu' 2 per cent. are the chief poisons suggested. Best results are obtained by treating rat-holes in the open, for then cyanide powders can be introduced and the holes securely blocked."

(1) Infestation Control: Rats and Mice. H.M. Stationery Office, 1946. Pp. 36. 1s. 6d.

* * * * *

ANIMAL GENETICS RESEARCH

Dr. C. H. Waddington, formerly of the Department of Zoology, Cambridge University, has been appointed to the vacant chair of animal genetics in the University of Edinburgh. It is also announced that a headquarters of the National Animal Breeding Research Organization is to be set up in Edinburgh.

The genetics laboratory of the organization, which has been occupying temporary accommodation in Hendon, will also be transferred to Edinburgh where it will, through the co-operation of the University, be housed in the Institute of Animal Genetics. The staff will work side by side with the University's own staff in the Institute which has for many years been concerned with animal breeding research.

Dr. Waddington will retain his position as chief geneticist in the Agricultural Research Council organization and will remain in charge of the more fundamental work of the organization.

An experimental field station will be established in the vicinity by the Agricultural Research Council, probably in close connection with the University farms. The purpose of this will be to provide facilities for experiments (such as the study of identical twins in cattle) in which the animals must be kept under close and continuous observation. Stock farms for more extensive breeding work will be acquired as opportunity offers.—*Farmers' Weekly*.

* * * * *

The Hereford Herd Book Society recently decided to revert to the pre-war practice of holding two-day shows and sales of pedigree Hereford cattle and to confine all entries to cattle from tuberculin tested herds. They are the first beef breed society to take this step.

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CLINICAL COMMUNICATION

Polyarthritis in Lambs

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It has been recognized for a considerable time that *Erysipelothrix rhusiopathiae* is occasionally encountered as the causal agent of arthritis in lambs: Poels (1913), Christiansen (1920), Panisset & Verge (1922), Cornell & Glover (1925), Carré (1931), Haworth (1933), Hellesnes (1935), Patrizi (1935), Caudron (1936), Cordier & Menager (1937), Barry (1937). The condition has been reported from many European countries including England and in New Zealand and the U.S.A. but it does not appear to have been reported from Scotland and it is for this reason that the present observations are recorded.

History

Two enzootics occurred in the spring and early summer of 1946. The two farms on which the disease was present were widely separated in the Borders of Scotland and both were carrying on typical sheep farming based on arable land. In neither case were pigs kept on the farm nor in the neighbourhood. One of the farms had had similar outbreaks of arthritis in lambs during previous years. The incidence of the disease was about 10 per cent.

Symptoms

The lambs were healthy when born but lameness developed in some cases within two or three days of birth while in others the lameness did not appear until the lambs were four to eight weeks old. The affected lambs showed slight swelling of many of the limb joints along with a characteristic twist of the feet. The course of the disease was chronic, the lambs becoming stunted and unthrifty.

Post-mortem Examination

Examination of several lambs which were killed in the late stages of the disease showed the presence of a chronic polyarthritis, the more commonly affected joints being the stifle and fetlock. In all the affected joints the synovial membrane was congested and thickened with granulation tissue to form synovial fringes and joint corpuscles. The synovial fluid was increased appreciably in amount and was turbid and rather gelatinous but pus was absent. The articular cartilages showed definite areas of ulceration and replacement by granulation tissue. There was also present a chronic periarticular inflammation involving tendon sheaths. In one case, a three months' old lamb with typical joint lesions, an ulcerative endocarditis was also present. The mitral valve was covered with large, friable vegetations which had spread to the mural endocardium. Apart from the above lesions no other abnormalities were present.

Bacteriological Examination

Cultures were made from the affected joints of three typical cases and from the vegetation of the heart valve. The material was cultured directly into 0·1 per cent. glucose broth and on to 0·5 per cent. glucose agar and on to blood agar. Growth occurred in the glucose broth and on the glucose agar in four days at 37° C. under both aerobic and anaerobic conditions. Growth on the blood agar was comparatively poor. In the glucose broth flocculi appeared at the bottom of the tube while on the glucose agar small clear colonies were present. The morphology of the organism was similar from both the glucose broth and the glucose agar. The bacteria were gram-positive non-motile rods or filamentous organisms staining unevenly giving a beaded appearance. Branching of the filaments appeared to be present. Gelatin stab cultures were made from the primary glucose agar colonies and a typical "test tube brush" growth occurred in five days. The organisms produced acid in dextrose and lactose; no change in maltose, mannite, sucrose and salicin. There was slight acidification of litmus milk.

Serological diagnosis of the organism was not carried out.

Pathogenicity tests on mice gave negative results even in doses of 0·1 c.c. of a three-day glucose broth culture.

Summary

Two enzootics of polyarthritis in lambs are recorded as occurring in Scotland. The causal agent had the morphological, cultural and biochemical characters of the rough form of *Erysipelothrix rhusiopathiae*. The incidence of the disease was at least 10 per cent. in both cases. In neither case was there any association with pig farming.

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REVIEWS

[**Penicillin : Its Properties, Uses and Preparation.** Prepared by the Pharmaceutical Society of Great Britain. Published by the Pharmaceutical Press, London, 1946, 10s 6d.]

This is a handy little volume setting out most of the existing knowledge of the chemistry and methods of preparation of penicillin. This is partly historical, but the book is written in such a way as to give the reader a balanced appreciation of the whole subject, ranging from the commercial manufacturer to the clinical use in human medicine and pharmacy. Unfortunately, it makes scanty reference to its veterinary uses, mainly because of the decision to prevent the drug being used for veterinary purposes for several years. This policy, in the opinion of the reviewer, was an unjustifiable one, and one which not only prevented the development of knowledge in so far as animal disease is concerned, but also slowed up the progress in human medicine, for work upon animals can be organized much more expeditiously. Nevertheless, despite the fact that reference to the veterinary use of the drug is restricted to two pages, it will be found of great assistance to any veterinary surgeon using the drug in practice.

The simple description of the chemical properties of penicillin, its pharmacology and its pharmaceutical preparations, will assist practitioners in the handling and application of the drug. It may tend to lessen the present necessity concerning the ready decomposition of the drug upon keeping, but nevertheless a true appreciation of its stability is essential to its proper use, particularly in veterinary practice where it has to be carried many miles, sometimes in hot weather through the country and, no doubt, will be left, on occasions, to be used by the farmer.

The price of the book is a reasonable one, and the preparation and printing of the text is clear and easy to read.

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[" **Irish Veterinary Journal.**" Vol. 1, No. 1. November, 1946. To be published quarterly—price 2s.]

We extend a hearty welcome to the *Irish Veterinary Journal*, the first number of which we have just received. It is published by The Veterinary Medical Association of Ireland as its official journal and is primarily intended for "members of our profession who are practising in Ireland." One special reason for its appearance is given in the message of welcome by the President of the V.M.A.I., who states that "Although *The Veterinary Record* has always made its pages available to the profession on this side of the water, unfortunately that valuable journal circulates among not more than 25 per cent. of our members here, and consequently does not meet our requirements." This statement is at once illuminating and sad, and as it carries its own moral we will not stress it further.

The history of its inception, and the policy to be followed, is noted in the editorial column, and *The Veterinary Record* may feel flattered that the general scheme of a journal committee with an Editorial Representative and the issue of a Supplement with reports of discussions at Association meetings for members only is similar to that found so successful with this journal.

The bulk of the Journal is printed in English, but there is one article of three pages in Irish and we regret that as we have to confess that we have no member of our staff capable of reading and translating it it might just as well have been printed in a Supplement for local circulation.

This first issue of the *Irish Veterinary Journal* contains an excellent Presidential address given by Mr. John A. Flynn, M.R.C.V.S., at the Annual General Meeting of the V.M.A.I., and outlines the progressive policy recommended by the Association's representatives before the Committee of Enquiry on Post-Emergency Agricultural Policy. This Committee has issued its third interim report entitled "Veterinary Services." Mr. Flynn summarizes their recommendations, and his critical examination of them makes most interesting reading for anyone interested in the progress of a State Veterinary Service.

Professor O'Dea makes an excellent contribution on Veterinary Ethics, useful both to practitioners and students, and there is an interesting first section of an article on "Veterinary Law."

Reference is made to the fact that the Munster Veterinary Medical Association has affiliated with the V.M.A.I., of which it now becomes the Munster Branch.

An interesting development is the institution of a "Students' Section," as the result of an arrangement with the Committee of the *Irish Veterinary Student* who have very generously agreed to merge their publication with the new Journal on the understanding that each publication shall contain a students' section contributed and edited by the students, and that one complete publication shall be compiled by the students.

In Academic Notes we welcome most warmly the announcement of the establishment of a Faculty of Veterinary Science in University College, National University of Ireland, and that negotiations are taking place with Trinity College, Dublin, with a similar object in view. This is a welcome acknowledgment of our profession and recognition of its academic status. We suggest that British universities should take note and not be left behind in respect of similar recognition.

The general presentation and make-up of the Journal is very pleasing.

ABSTRACTS

[**Sulphonamides in the Treatment of Caecal Coccidiosis of Chickens.** Horton-Smith, C., & Boyland, E. (1946.) *Brit. J. Pharmacol. and Chemotherapy.* **1**. No. 2. 139-152.]

One-week-old cockerels, instead of drinking water, were allowed access to sodium sulphamezathine (sulphadimethylpyrimidine) in solutions varying from 0·025 to 0·2 per cent. at intervals of 24, 48, 72 and 96 hours after experimental infection with *Eimeria tenella*. The 0·2 per cent. solution was found to be the most effective in controlling the infection, even when administration was delayed for 72 hours after infection. In another experiment it was found that this concentration of the drug was also the most effective in controlling an induced epidemic of caecal coccidiosis. This treatment, carried on for three days after the last death from coccidiosis, is probably sufficient to control an outbreak of the disease, and it is recommended that the duration of treatment should not exceed one week, owing to the possibility of certain toxic effects.

Comparisons of various sulphonamides with sodium sulphamezathine showed that sulphapyridine, sulphathiazole and sulphaguanidine failed to control established infections. Sulphadiazine (sulphapyrimidine) and sulphamerazine (sulphamethylpyrimidine) were about one quarter as effective as sulphamezathine. Only sulphapyrazine proved to be more effective than sulphamezathine, a 0·1 per cent. solution preventing symptoms even when treatment had been delayed for 72 hours after infection. Chicks, which had recovered from caecal coccidiosis after treatment with the last two drugs, showed a marked resistance to reinfection five days after cessation of treatment.

The relative effectiveness of sulphapyrazine and sulphamezathine was found to depend upon the concentrations of the drugs obtained in the blood. In the case of the latter drug, administration of a 0·2 per cent. solution resulted in a blood concentration of 5 to 10 mg. per 100 ml. The action of both these drugs was antagonized by *p*-aminobenzoic acid.

M. L. B.

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[**Trials with Phenothiazine-Salt Mixtures for the Prevention of Parasitic Gastritis in Lambs.** Harbour, H. E., Morgan, D. O., Sloan, J. E. N., & Rayski, C. (1946.) *J. comp. Path.* **56**. 180-195.]

In view of the favourable American reports of the anthelmintic effect of a phenothiazine-salt mixture on sheep which are allowed free access to it, trials were carried out to determine whether this method would be of use, under conditions prevailing in S.E. Scotland, in preventing the development of clinical parasitism.

Following preliminary trials on weaned hill lambs in autumn, the main experiments were made, during two summers, on lambs running with their mothers on first and second year pastures.

Comparisons of weight gains, worm egg counts and pasture level estimations were made on groups of lambs (*a*) treated with phenothiazine, (*b*) allowed access to a phenothiazine-salt mixture, (*c*) untreated controls. As no *post-mortem* examinations of faecal cultures were made, the species of worms involved were not accurately determined, and the egg counts refer to all species except *Nematodirus* and *Strongyloides*, which were noted separately.

In the preliminary trials with a 1:14 phenothiazine-salt lick there was some reduction in the egg counts although the pasture was only lightly infested, but this reduction was not so marked as that produced by phenothiazine dosing. The weight gains were slightly greater with the latter method than with the former, which showed no superiority over the controls.

In the main trials on a different pasture, a 1:15 and, later, a 1:9 lick was used. In all cases access to phenothiazine-salt licks resulted in a lowered egg count. In the first summer (1944), treatment was begun two to three months before weaning, although, as expected, the level of infestation remained very low until after weaning. Whilst the weight gains showed a satisfactory increase

(*Concluded at foot of Col.* 1, *page* 32)

Questions and Answers

The submission of questions for inclusion in this column will be welcomed: they can relate to any aspect of veterinary work. For purposes of record, each question is numbered, and those submitting questions are required to furnish (not for publication) name and address.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.
All communications should be addressed to the Editor.

Treatment of Diarrhoea

Q. CLXXVIII.—*In view of our present knowledge of the physiology and pathological flora of the alimentary canal, is the primary administration of a purgative a rational treatment for diarrhoea or may reliance be placed solely on the "gut-sulphonamides"?*

A.—Rational treatment of diarrhoea depends primarily upon the establishment of a differential diagnosis in so far as aetiology is concerned. In cases where the cause is considered to be an irritant, *e.g.* chemical or dietetic, the use of a purgative to initiate treatment is rational in an endeavour to remove any residual traces of the irritant material; the subsequent treatment would be purely protective in character and recovery should be rapid.

In cases where the cause of the diarrhoea is considered to be bacterial, whether due to secondary invaders, which are pathogenic, during the course of an infectious disease, *e.g.* canine distemper, or to a disproportionate multiplication (and possibly enhanced virulence) of the normal flora of the gut following lowered resistance of the host, the use of purgatives is contra-indicated and treatment should comprise exhibition of the gut-active sulpha drugs, *e.g.* phthalyl-sulphathiazole or sulphaguanidine, possibly combined with administration of mechanical protectives in the later stages. In the case of a bacterial enteritis in which the causal organism is not susceptible to sulpha drugs other drugs such as brilliant green may be used.

Differential diagnosis in any obstinate case should include the consideration of coccidiosis as the cause.

In short, in no cases other than those in which diarrhoea is believed to be due to a non-bacterial irritant should purgatives be included in treatment.

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Caesarean Section *versus* Hysterectomy

Q. CLXXIX.—*What are the guiding factors for deciding on the adoption of caesarean section or hysterectomy in delayed treatment of dystokia of small animals?*

A.—The duration of labour pain to operation is the main factor in deciding between caesarean section in hysterectomy in small animals.

Wright gives the following figures:

Up to 24 hours: Caesarean section.

24 to 48 hours: Decision will probably be delayed until condition of uterus is seen on operation.

After 48 hours: Caesarean hysterectomy.

In taking the decision it should be remembered that surgical shock is very severe following removal of the gravid uterus and that whilst the prognosis for caesarean section in an early case is very good, prognosis in any case of caesarean hysterectomy is poor.

Factors which will militate against the successful performance of caesarean section include:

(1) Prolonged interference *per vaginam* in an endeavour to achieve forceps delivery, which has caused severe trauma to vaginal and uterine tissue.

(2) Rapid putrefaction of foetuses with bacterial invasion of the uterine wall, as in cases where anaerobic infection is established.

(3) Rupture of the uterus.

It is undesirable to take much account of the consideration of obviating future pregnancies, in view of the poor prognosis following hysterectomy: it would be preferable to ensure sterility by ligation of Fallopian tubes or to undertake ovariectomy and/or hysterectomy at a later date.

In an occasional case in category 3, *i.e.*, over 48 hours, caesarian hysterectomy will almost certainly be the operation of choice because of gross putrefactive changes; but due to a foetus being firmly wedged in the uterine body and vagina, section may be impossible without undertaking hysterectomy for removal of the obstructing foetus. In such a case, despite infection of the uterus, it may be wiser to perform hysterectomy only, since the prolonged operation and severe surgical shock if this is followed by hysterectomy will almost certainly cause death.

In cats these figures may be complicated by the fact that occasionally parturition ceases for 12 to 24 hours and then recommences normally. In such cases the degree of infection will be the deciding factor.

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Stilboestrol Dipropionate in Misalliance

Q. CLXXX.—*The use of stilboestrol dipropionate by intramuscular injection in cases of misalliance in bitches is now well recognized.*

Has this, or any other hormone preparation, been used in cattle for the same purpose?

A.—So far no reliable evidence has been adduced to show that stilboestrol dipropionate can terminate a misalliance in the cow. Theoretically, the introduction of stilboestrol through the cervical canal would appear to be the procedure most likely to succeed in bringing about the desired effect.

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Correspondence

Deficiencies in the Dietary of Brood Mares and Foals

In the reply to Q. CLXX about rectifying suspected deficiencies in the dietary of brood mares and foals, it was stated that "if iodine deficiency is considered to be present the animals' minute requirements would be met by feeding half to one ounce of blood meal daily."

As I have never come across any evidence that blood meal is an adequate or reliable source of iodine, I wonder whether the recommendation of its use for this purpose was made in error?

Yours truly,

F. Ewart Corrie.

Kelvingrove,
Worsted Lane,
East Grinstead, Sussex.

[Our respondent to the question writes:

The actual amount of iodine present in blood meal is apparently not agreed upon by the chemists. Some report a very small trace; others define the average amount as one part in four million, while one worker gives a figure six times as high as this, putting blood meal on a level with herring fish meal as regards iodine content.

On full investigation the weight of evidence would seem to be against the suggestion made that there is sufficient iodine in blood meal to replace an iodine deficiency. The writer wished to stress the risk of iodism involved in feeding potassium iodide over a long period. If an iodine deficiency is suspected or proved the iodine would be more safely added by changing the rations or adding a substance known to be comparatively rich in iodine. There would seem to be no doubt that cod liver oil in daily doses of an ounce contains sufficient iodine for this purpose.]

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Treatment of Haematuria

Sir,—The writer of the answer to question CLXXVII on the treatment of haematuria in the issue of *The Veterinary Record* of January 4th, 1947, appears to have made an erroneous diagnosis.

From the symptoms, and particularly the bladder lesions, described by the questioner, the condition is almost certain to be haematuria vesicalis bovis, or chronic cystic haematuria of cattle. The confusion has probably arisen from the questioner's statement that the condition usually appears about two months before parturition. Haematuria vesicalis bovis has an almost world-wide distribution. In Britain it is most commonly seen in hill districts where the pasture is poor, and the incidence of the disease on any one farm is normally very low. In certain areas, the incidence may be relatively high. The condition is common in the Yorkshire dales, but an outbreak of the disease involving over 20 animals on one lowland farm is at present under investigation. On this farm, and on the dales farms, where the cases have been seen it has been shown that the disease is not necessarily associated with pregnancy, although the first symptoms in a number of cases have appeared just before or after parturition.

The disease is particularly common in Western Canada where a considerable amount of research work has been carried out. The cause has not yet been discovered, nor has any suitable treatment. Irrigation of the bladder with styptics will relieve the haematuria

(*Continued at foot of Col.* 1, *page* 34)

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in all three groups throughout the trial, in the final six weeks both phenothiazine groups showed a significant superiority over the control group. In the following year, when the pasture was more heavily infested, both phenothiazine groups showed significantly greater weight gain and lower egg counts than the control group. At the end of the trial the number of larvae per pound of herbage was about three times greater on the control plot than on the two phenothiazine plots.

It is suggested that phenothiazine-salt licks may help to reduce pasture contamination and so allow of a less rigorous dosing programme with a consequent saving of labour and handling. It is emphasized that further experiments would have to be done before the method could be generally recommended for use in this country.

M. L. B.

N.V.M.A ANNUAL CONGRESS, 1947

LIST OF HOTELS, ETC., IN EDINBURGH AND SURROUNDING DISTRICTS

It has been decided to hold the 1947 Congress in Edinburgh from July 28th to August 1st inclusive. It is desirable that applications for accommodation should be made as early as possible as hotels and boarding-houses are already booking for next summer.

If any members fail to obtain suitable accommodation they should get in touch with the Hon. Local Secretary, Professor A. Robertson, Royal (Dick) Veterinary College, Edinburgh 9, who will endeavour to assist them.

Name and Address of Hotel	Terms per Week	Terms per Day
Licensed		
Braid Hills Hotel, Edinburgh	7–8 gns.	—
Caledonian Hotel, Princes St., Edinburgh	9½–12½ gns.	—
Cockburn Hotel, Edinburgh	6 gns.	—
George Hotel, 21, George St., Edinburgh	—	£1/0/6–£1/2/6
Harp Hotel, Corstorphine, Edinburgh	6 gns.	—
Imperial Hotel, 143, Leith St., Edinburgh	6 gns.	—
North British Station Hotel, Princes St., Edinburgh	—	25/– – 28/6
Queen Hotel, Edinburgh	7–8 gns.	—
Roxburghe Hotel, Charlotte Sq., Edinburgh	—	27/–
Royal British Hotel, 20, Princes St., Edinburgh	8 gns.	—
•Rutland Hotel, 3, Rutland St., Edinburgh	—	12/6–18/6
Unlicensed		
Abercromby Hotel, Edinburgh	4½–5½ gns.	—
Afton Hotel, Grosvenor Cres., Edinburgh	£6/9/6–7 gns.	—
Alexander Hotel, 1, Hunter Sq., Edinburgh	£3/10–£4	—
Alison Hotel, 1, Melville Cres., Edinburgh 3	5–8 gns.	—
Annorma House Hotel, 8, Nile Grove, Edinburgh 10	6 gns.	—
Bellevue Private Hotel, 13, Inverleith Row, Edinburgh 4	4–5 gns.	—
Blair Atholl Hotel, 10, Grosvenor Sq., Edinburgh 12	4½–5½ gns.	—
Carahane Hotel, 1, Peel Ter., Newington, Edinburgh 9	7–10 gns.	—
Carlton Private Hotel, Edinburgh	5 gns.	—
Chimes Hotel, 3, Royal Ter., Edinburgh	6 gns.	—
Clifton Hotel, 53, Promenade, Portobello, Edinburgh	4½–6 gns.	—
Crown Hotel, Torphichen St., Edinburgh	5 gns.	—
Darlings Regent Hotel, 21, Waterloo Pl., Edinburgh	£7/14	—
Donmaree Hotel, 21, Mayfield Gardens, Newington, Edinburgh 9	7–8 gns.	—
Edward Hotel, 57, Gt. King St., Edinburgh	5 gns.	—
Ettrick Private Hotel, Edinburgh	5–6 gns.	—
Gloucester Hotel, Gloucester Pl., Edinburgh	4½–5½ gns.	—
Gordon Hotel, 7, Royal Circus, Edinburgh 3	3½–6 gns.	—
Grange Hotel, 10, Chalmers Cres., Edinburgh	£3/10–4 gns.	—
Green's Hotel, Eglinton Cres., Edinburgh	5½–7 gns.	—
Halcyon Hotel, 8, Royal Ter., Edinburgh	5½ gns.	—
Haymarket Hotel, 1, Coates Gdns., Edinburgh	4 gns.	—
Holme Hotel, 12, Royal Circus, Edinburgh 3	3½–5 gns.	—
Iona Private Hotel, Strathearn Pl., Edinburgh	5 gns.	—
Janette Hotel, 9, Royal Ter., Edinburgh	5 gns.	—
Lea Private Hotel, 69, Leamington Ter., Edinburgh	5 gns.	—
Leamington Hotel, Leamington Ter., Edinburgh 10	7 gns.–£8/15	—
†Magdala Hotel, 4, Magdala Cres., Edinburgh 12	—	7/6–8/6
Maitland Hotel, 33, Shandwick Pl., Edinburgh	5–6 gns.	—
Mayfield Private Hotel, 15, Mayfield Gdns., Edinburgh 9	5½–6 gns.	—
Melrose Private Hotel, 47, Minto St., Edinburgh	4½ gns.	—
Menzies Hotel, 26, Royal Ter., Edinburgh	5 gns.	—
Palmerston Private Hotel, 56, Palmerston Pl., Edinburgh	—	13/6–15/–
Pirie's Hotel, 6, Coates Gdns., Edinburgh	5 gns.	—
Regent Private Hotel, 6, Regent Ter., Edinburgh 7	3½–4½ gns.	—
Rosslyn Private Hotel, 9, Palmerston Pl., Edinburgh	3½–5 gns.	—
Royal Stuart Hotel, 18, Abercromby Pl., Edinburgh	4½–7 gns.	—
Shelbourne Hotel, Edinburgh	£6/9/6	
St. Alban's Hotel, 9, Rutland Sq., Edinburgh	£4/14–£5/10	
St. Andrew Hotel, 8, South St., Andrew St., Edinburgh 2	£6/2/6–7 gns.	—
Suttie's Hotel, Edinburgh	6 gns.	—
Terrace Hotel, Edinburgh	5 gns.	—
Varrich House Private Hotel, 7, Church Hill, Edinburgh 10	5–6 gns.	—
Boarding Houses		
Greenhill House, 12, Strathearn Pl., Edinburgh	4–5 gns.	—
Learmonth Guest House, 11, South Learmonth Gdns., Edinburgh	—	12/6
Mayflower Board Residence, 15, Glenorchy Ter., Edinburgh 9	—	11/– – 12/–
Richmond House, 20, Leopold Pl., Edinburgh	—	9/– – 10/6
Springbank, 22, Bath St., Portobello, Edinburgh	£3/10	—
Tigh-na-Bruaich, 57, Orchardhead Rd., Liberton, Edinburgh 9	5 gns.	—
West Colinton Guest House, Colinton, Edinburgh 13	5 gns.	—
Hotels EAST LOTHIAN		
Goblin Ha' Hotel, Gifford	5 gns.	—
Bissets Hotel, Gullane	7 gns.	—
Linga Hotel, Gullane	6–7 gns.	—
Queen's Hotel, Gullane	Opening in the Spring—Terms not yet quoted	
Ardrulin Private Hotel, Clifford Rd., N. Berwick	7 gns.	—
County Hotel, High St., N. Berwick	5 gns.	—
Dunedin Lodge, N. Berwick	£6	—
King's Knoll Hotel, Clifford Rd., N. Berwick	7 gns.	—
Marine Hotel, N. Berwick	£9/2/6–£12/12/6	
Royal Hotel, Station Rd., N. Berwick	7–8 gns.	—
Castle Hotel, Dirleton	5 gns.	—
Craig-en-Gelt Hotel, Dunbar	6 gns.	—
George Hotel, Haddington	4 gns.	—
MIDLOTHIAN		
Juniper Lea, Blackshiels	5 gns.	—
Harrow Hotel, Dalkeith	6–7 gns.	—
Orford House Private Hotel, Dalkeith	—	15/– – 18/–
‡Melville Castle, Lasswade	5–7 gns.	—
Royal Hotel, Stow	£4/10	—
WEST LOTHIAN		
Cramond Bridge Hotel, Cramond	4 gns.	—
Hawes Inn, South Queensferry	5½–6 gns.	—
Queensferry Arms Hotel, S. Queensferry	£4/7/6	—
Staghead Hotel, South Queensferry	£7–8 gns.	—
Roadhouse Hotel, Near Whitburn	5½ gns.	—
PEEBLES-SHIRE		
Traquair Arms Hotel, Innerleithen	5–6 gns.	—
Green Tree Hotel, Peebles	£5	—
Tontine Hotel, High St., Peebles	5 gns.	—
Waverley Hotel, High St., Peebles	5 gns.	—
Cross Keys Hotel, Peebles	5 gns.	—
Minden Hotel, Innerleithen Rd., Peebles	5 gns.	—
Romanno Bridge Hotel, Romanno Bridge	£4/10	—

• Meals extra. † Bed and breakfast only. ‡ Opening Mar. 1st.

Loss of Surgical Equipment, Baggage, etc.

Special Insurance Cover for Members, N.V.M.A.

The recent loss by a well-known member of an expensive case containing an exceptionally valuable collection of instruments and professional equipment has served to focus attention on (1) the inadequacy of common forms of insurance to cover such losses, (2) the seriousness of them in relation to the present day high cost of replacement and (3) the necessity for special insurance, particularly in view of the great increase at the present time of robbery and theft of all descriptions.

Such losses can be covered only to a very limited extent by standard forms of insurance, such as House Comprehensive, Motor, etc. Recently, there has been an epidemic of thefts from motor cars and the position under the ordinary standard form of motor policy is that there is no cover at all in respect of baggage and the general contents of a car unless a special extension of the policy has been applied for and an extra premium paid. Even then, the standard extension clause limits its cover to rugs, coats and luggage *excluding "trade goods and samples"* (the italicised insertion has a wider implication—see next paragraph) and the limit of liability is only £20 in all.

By comparison, under the "N.V.M.A. Comprehensive Motor Policy," all the aforesaid articles, including surgical instruments, drugs and the like, are covered automatically and *without additional premium* but the limit of liability is £20 in all under each such sub-section of the policy, and this is the highest limit that can be granted—or reasonably can be expected—under a motor policy. Even if a much higher limit could be arranged under a motor policy, the protection still would be woefully incomplete inasmuch as it would make no provision for losses whilst travelling by conveyances other than a specified motor car or from hotels, restaurants, cloakrooms or from other locations or in other circumstances too numerous to itemize.

The Association's Insurance Brokers have been asked to tackle this problem, with the result that they have now been able to arrange a special insurance cover for the benefit of N.V.M.A. members. The policy offered provides cover against "All risks of loss or damage of whatsoever nature" on personal belongings and effects, baggage and the like, including surgical instruments and drugs incidental to the insured's profession, whilst anywhere in the United Kingdom except at the insured's permanent place of residence which is deemed to be separately insured.

Cover includes miscellaneous articles of jewellery and fur but excludes articles of jewellery and fur exceeding £25 in value per article unless such special valuables are separately described and valued in the policy.

The rate of premium is 30s. per cent. per annum. Insurance must be affected for the full value of the goods, including cases and surgical instruments, which the insured and members of his family accompanying him will have in transit or anywhere outside his own permanent domicile at any time during the year.

The policy contains the usual warranty requiring that property shall not be left in unattended motor vehicles unless the same are securely locked and fastened.

Members who find it necessary to travel extensively and to carry with them valuable property are strongly advised to avail themselves of this new form of insurance which gives the utmost possible protection in all directions. Applications for cover and further information should be addressed to S. H. Cannon & Company Limited, Incorporated Insurance Brokers, 112/114, Fenchurch Street, London, E.C.3. Telephone: ROYAL 7687/9.

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It was unanimously agreed at the recent Assembly in Berne, Switzerland, of the Permanent Bureau of the International Dairy Federation that the 12th World's Dairy Congress in 1949 should be held in Stockholm.

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temporarily but subsequent haemorrhages occur and no animal has yet been known to have been cured. Death from acute haemorrhage may occur in some cases within a month or less from the first symptoms. Other cases have been known to live up to five or six years with intermittent minor haemorrhages before eventually dying from acute haemorrhage.

Pyelonephritis has only been seen once in the considerable number of cases investigated in Yorkshire. Normally, the kidneys are not affected, or only show areas of haemorrhage.

The condition is most serious in male animals when obstruction of the urethra may cause retention of urine and death from uraemic poisoning.

Yours faithfully,

P. L. Shanks.

Quarry Dene,
Westwood Lane, Leeds, 6.
January 4th, 1947.

NOTES AND NEWS

Diary of Events

Jan. 25th.—Meeting of the Biochemical Society at the British Postgraduate Medical School, Ducane Road, Hammersmith, W.12, 11 a.m.

Jan. 31st.—Meeting of the Lancashire Division, N.V.M.A., at Liverpool University (Geology Lecture Theatre, Brownlow Street), 2 p.m.

Jan. 31st.—Annual General Meeting of the Royal Counties Division, N.V.M.A., at Reading (Caversham Bridge Hotel), 2.30 p.m.

Jan. 31st.—Annual General Meeting of the North of Ireland Division, N.V.M.A. (Carlton Hotel), 2.45 p.m.

Feb. 7th.—Annual General Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Metropole Hotel), 2.30 p.m.

July 28th—Aug. 1st.—N.V.M.A. Annual Congress in Edinburgh.

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New Appointments to the Staff of the Ministry of Agriculture

As notified in recent issues, Council, N.V.M.A., has decided that no advertisements for appointments to the veterinary staff of the Animal Health Division of the Ministry of Agriculture shall be accepted for *The Veterinary Record* pending the settlement, in a manner satisfactory to the Association, of the question of the status and salaries of the Veterinary Officers of the Division.

In the meantime, any members of the profession who may, nevertheless, contemplate applying for such posts, should these be advertised elsewhere, are requested first to communicate with the General Secretary of the Association at 36, Gordon Square, London, W.C.1.

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Distemper Prophylactics

On May 4th, 1946, we intimated that representatives of the N.V.M.A. had discussed with Messrs. Burroughs Wellcome & Company the difficulties which had arisen through the shortage of distemper prophylactics, and we announced a rationing system which it was hoped would remove some of the frustrations and disappointments then existing. That scheme had been in operation since June, 1946. It appears to have been open to less objection than previous attempts to make a fair distribution of the limited supplies available to the profession.

The Association has now been informed that the production position is materially improved, but unfortunately, is not yet sufficiently good to permit supplies becoming freely available. Allocation will continue until, at the earliest, March 8th, 1947, but until then practitioners who have intimated their estimated requirements for the current period can expect them to be met in full when their allocation falls due. Those who have not intimated their requirements, or who wish to increase their estimate, may place orders with the suppliers at any time and expect them filled by the offer of material at the next convenient allocation date.

The Association intends to meet the suppliers in the near future and, while its objective will be the freeing of the supply of distemper prophylactics from any form of rationing, it may be forced through continued shortage to accept some form of allocation. The officers would, then, be pleased to receive representations and suggestions from practitioners with a view to having the current arrangements made more convenient to the profession.

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PERSONAL

Birth.—Day.—On January 3rd, 1947, at Stanford-in-the-Vale, Berks, to Evelyn (*née* Ingram) and K. S. J. Day—a second son, Christopher.

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Marriage.—Bullen—Clark.—The marriage took place on December 21st, 1946, at St. Cuthbert's Church, Allendale, of John Jaques Bullen, M.R.C.V.S., of 64, Rofant Road, Northwood, Middlesex, and Catherine Lightfoot Clark, M.R.C.V.S., of "Wayside," Allendale, Northumberland.

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Major Mattinson Presides at a Presentation.—The Preston Guardian records that at a gathering of old students and former members of the staff at the County Institute of Agriculture, Hutton, Mr. J. J. Green, who has retired from the position of principal, was presented with a cheque. He was principal of the County Institute for no fewer than 27 years, and many students who have since achieved distinction in the realms of agricultural science and education came under his guidance.

The ceremony was presided over by Major A. B. Mattinson, last year's president of the Royal College of Veterinary Surgeons, who

was himself a member of the first class that was formed in Lancashire for agricultural education about 50 years ago.

Major Mattinson, after paying tribute to Mr. Green, referred to changes that had taken place and said one which he much regretted was the decision to prohibit the award of the National Diploma in Agriculture and the National Diploma in Dairying at the Institute.

* * * *

Retirement of Mr. Alexander Veitch.—Mr. Alexander Veitch, of Locking Road, Weston-super-Mare, where he has carried on a successful practice for 53 years, is shortly retiring, and (says the *Weston Mercury*) although his many farming friends all over the district will greatly regret his secession from active work, they will join in wishing him years of happiness in his well earned retirement.

Mr. Veitch qualified at Glasgow in 1890. After a few years' work in the north of England he went to Weston in 1893, his practice soon extending many miles from Weston itself.

At one time he had a highly prized pen of pouter pigeons, breeding birds which secured the highest awards at national shows. He was in demand as a judge of Pouters at the biggest shows in the Kingdom. He also officiated at the many horse shows held in the town.

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R.C.V.S. OBITUARY

Hall, Edwin, "Merlewood," 14, Christine Avenue, Wellington, Shropshire. Graduated Edinburgh, December 19th, 1893. Died December 29th, 1946; aged 81 years.

Inglis, Major Thomas Matthew, J.P., Ingleside, Forfar. Graduated N. Edinburgh, December 17th, 1888. Died January 5th, 1947.

The wide circle of our readers who knew Major Inglis will learn of his death with deep regret. The sad information reaches us as we go to press and further reference will be made in our next issue.

Wilson, Albert Collins, Capt. R.A.V.C. (retired). Graduated London, December 14th, 1893. Died, January 6th, 1947; Aged 74 years.

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE MONTH ENDED DECEMBER 31ST, 1946

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
ENGLAND					
Bedford	—	14	14	326	130
Berks	2	61	63	2,190	1,480
Bucks	—	50	50	2,026	1,130
Cambridge	—	—	—	—	—
Cheshire	1	212	213	6,591	2,569
Cornwall	—	—	—	—	—
Cumberland	—	17	17	482	395
Derby	—	245	245	6,734	3,885
Devon	1	183	184	2,521	1,638
Dorset	—	18	18	565	296
Durham	—	187	187	3,856	1,643
Essex	—	117	117	4,035	2,631
Gloucester	—	42	42	964	842
Hampshire	1	231	232	6,776	4,944
Hereford	—	5	5	206	99
Hertford	—	39	39	1,199	802
Hunts	—	1	1	41	—
Isle of Ely	—	1	1	57	21
Isle of Wight	—	—	—	—	—
Kent	5	88	93	2,155	1,422
Lancs	—	103	103	3,172	1,098
Leics.	1	72	73	1,857	1,425
Lincs (Holland)	—	—	—	—	—
Lincs (Kesteven)	—	15	15	109	152
Lincs. (Lindsey)	—	29	29	698	485
Middlesex	—	6	6	144	144
Norfolk	—	75	75	2,398	1,072
Northants	1	31	32	802	933
Northumberland	—	43	43	1,406	977
Notts	8	114	122	2,648	1,298
Oxford	—	18	18	442	362
Rutland	—	1	1	24	11
Salop	1	93	94	2,564	1,580
Soke of Peterborough	—	—	—	—	—
Somerset	7	179	186	4,717	2,303
Staffs	3	113	116	2,730	2,633
Suffolk (East)	—	29	29	556	439
Suffolk (West)	—	35	35	738	667
Surrey	1	71	72	2,241	1,107
Sussex (East)	4	63	67	1,817	1,149
Sussex (West)	—	52	52	1,322	847
Warwick	—	72	72	1,622	1,382
Westmorland	—	2	2	20	19
Wilts	—	52	52	2,184	911
Worcester	3	99	102	1,947	982
Yorks (E.R.)	—	64	64	1,229	705
Yorks (N.R.)	—	62	62	2,542	711
Yorks (W.R.)	—	139	139	3,322	1,410
Total, England	39	3,143	3,182	83,975	48,729
WALES					
Anglesey	1	11	12	1,811	201
Brecon	—	9	9	156	94
Caernarvon	—	35	35	540	275
Cardigan	—	35	35	673	394
Carmarthen	7	138	145	2,761	1,513
Denbigh	—	20	20	488	199
Flint	—	35	35	757	491
Glamorgan	—	47	47	746	365
Merioneth	—	10	10	132	49
Monmouth	1	8	9	195	62
Montgomery	—	7	7	113	86
Pembroke	1	11	12	334	381
Radnor	—	—	—	—	—
Total, Wales	10	366	376	8,706	4,110
Total, England and Wales	49	3,509	3,558	92,681	52,839

Notes.—(1) Operative periods of undertakings: 1 year, 1,046; 2 years, 183; 3 years, 2,329. (2) Undertakings renewed for further periods: 1 year, 2,334; 2 years, 249; 3 years, 1,010. (3) Undertakings not renewed at end of operative periods: 4,533. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for further periods. Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified		Total Undertakings		
	During Month	Previously	Number	Number of Cattle	
				Cows	Heifers
SCOTLAND					
Aberdeen	—	17	17	888	882
Angus	—	14	14	531	365
Argyll	—	1	1	22	41
Ayr	—	11	11	343	227
Banff	—	1	1	120	20
Berwick	—	1	1	22	7
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	3	3	131	80
Dumfries	—	11	11	564	499
Dunbarton	—	1	1	60	40
East Lothian	—	1	1	20	8
Fife	—	21	21	734	445
Inverness	—	2	2	106	46
Kincardine	—	2	2	81	48
Kinross	—	3	3	62	43
Kirkcudbright	—	7	7	839	681
Lanark	—	7	7	296	225
Midlothian	—	—	—	—	—
Moray	—	—	—	—	—
Nairn	—	—	—	—	—
Orkney	—	—	—	—	—
Peebles	—	—	—	—	—
Perth	—	7	7	262	183
Renfrew	—	4	4	151	101
Ross-shire	—	1	1	58	43
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	—	8	8	294	245
Sutherland	—	3	3	70	39
West Lothian	—	2	2	75	22
Wigtown	—	15	15	1,084	628
Zetland	—	—	—	—	—
Totals	—	143	143	6,813	4,418

Notes.—(1) Duration of undertakings: 1 year, 37; 2 years, 7; 3 years, 99. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 97; 2 years, 9; 3 years, 70. (3) Undertakings expired and not renewed (not included in column 2 of statement): 250. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

FOOT-AND-MOUTH DISEASE:

Dorset.—Church Farm, Ryme Intrinseca, Dorset (Jan. 1st); Cowpool Farm, Clifton Maybank, Yeovil; Skinners Farm, Stoke Wake (Jan. 9th); Leweston Farm, Long Burton, Sherborne, Dorset (Jan. 10th); Coats Farm and West Hall Farm, Bettiscombe, Dorset (Jan. 13th); Bowgrave Farm, Beaminster, Dorset (Jan. 13th).

Somerset.—Lyde Lane Fields, Yeovil, Somerset (Jan. 8th); Fair House Farm, Stopford, Yeovil, Somerset (Jan. 10th); Bridghampton Farm, Bridghampton, Yeovilton, Somerset (Jan. 10th).

SWINE FEVER:

Leics.—11, Leicester Road, Oadby, Leicester, Leics. (Jan. 11th).

SHEEP SCAB:

Merioneth.—Henblas, Llandderfel, Merioneth (Jan. 9th).

Notts.—Forest View Farm, Ollerton, Newark, Notts. (Jan. 1st).

* * * * *

The Shire Horse Society's show will be held at Derby on March 12th. The Agricultural Hall, Islington, is not available for use by the horse-breeding societies which once promoted shows there.

SHORTAGE OF SCIENTIFIC AND TECHNICAL BOOKS

In its issue of December 28th, *Nature* comments that the position disclosed by Sir Walter Layton in his recently issued pamphlet "Newsprint—A Problem for Democracy" is not without relevance to the scientific and technical Press.

"Sir Walter Layton's pamphlet," says *Nature*, "makes it abundantly plain that the critical importance of an adequate supply of newsprint is not adequately appreciated by the Government, and scientific workers on their side have the painful experience of the war years to impress on them the failure of either the Ministry of Supply or the Board of Trade to realize that books and periodicals are tools of research as essential as apparatus and laboratories. To a Government department a first-class scientific monograph or work of reference is equated with the latest novel or a bag of chalk, and most technical or scientific librarians could testify to their inability to secure any acceleration of the import of the text-books which research workers were urgently demanding. It is understandable that the output of British scientific and technical books should in war-time have dwindled to negligible proportions, and it was inevitable that the supply of such books from European sources should be interrupted. That no Government department should have appreciated that this situation accentuated the need to import American books is another question, and such departmental short-sightedness was at times a direct handicap to research and to our war effort.

"What is discouraging is to find so slight an improvement in the position 18 months after the termination of hostilities in Europe. The output of British scientific and technical books is still slight, due in large part to the shortage of man-power. Dollar stringencies are still allowed to curtail our imports of American books. American publishers are to be congratulated on the energy with which they have faced the situation and for their enterprise in the reproduction of important German scientific and technical books; nevertheless, we are entitled to ask whether it is likely to be in the interest of Britain or of its scientific workers to leave such developments exclusively in other hands.

"The shortage is particularly acute as regards publications of the text-book class. Correspondence in the columns of *The Times* on the shortage of books and the difficulties which university students experience in consequence is corroborated in the annual reports of important public libraries, one of which states that 20 students may be waiting at the same time to use the sole copy of a particular book which the students themselves are unable to buy or to borrow elsewhere. Moreover, the abnormal demands at present made on the universities, and the shortage of teachers increase the importance of text-books in university education. Without books, as Sir Charles Grant Robertson observed in this connection, a real university education is impossible; nor in such conditions is it possible to explore in the newer universities the possibilites of the tutorial system as opposed to the lecture system on lines, for example, such as Dr. C. H. Waddington has suggested.

"The repercussions of this shortage of books are in fact not felt solely in the universities, or in research, in industry, or in Great Britain alone. They affect the Colonial Service courses and also, as Sir Stanley Unwin has pointed out, there is an acute and unsatisfied demand for British books on the continent of Europe and elsewhere. One function of the British Council is to make known British culture and achievements; but the actual production of scientific and technical text-books certainly does not come within its competence. It is doubtful whether much success can be expected to attend the establishment of an emergency pool of text-books, for example, by the University and Research Section of the Library Association; such copies as exist are unlikely to be idle and available for pooling. Moreover, such measures are at best palliatives and should not be allowed to deflect attention from the main objective—the increase of production.

"As Mr. H. M. Cashmore, president of the Library Association, urges in his letter to *The Times*, the production of books, including the reprinting of standard texts, is a matter of vital importance. Scientific men may well be expected to take whatever steps are in their power to facilitate and co-ordinate supplies of materials, and to renew their representations to the Governments on the importance of books not only in the training of students, in the formation of opinion and the promotion of international understanding and the exchange of knowledge, but also as essential tools in research and production. Nor should they forget that in the present situation it behoves them to see that the most effective use is made of available supplies of material for book production. There is no room for books or for periodials which will not bear searching objective scrutiny, and the present shortage of labour makes it the more imperative that scientific workers should not only set their own house in order by the elimination of redundant books and periodicals: but also, by the rigorousness of their criticism and the impartiality and objectiveness with which they review scientific and technical publications, they can ensure that the highest possible standards of production and content are attained. This much being done, however, the central problem is the man-power situation. Until the various industries concerned in the production of books can employ the requisite number of workers and also make full use of their material equipment, the supply of all types of books is bound to continue seriously to lag behind the demand."

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Erratum.—The Ministry's article on Artificial Insemination, reproduced in our issue of December 28th, 1946 (pp. 626-627), contains a small error which we are asked to correct. In the named list of centres, the date of starting of the Cambridge centre should be November, 1942, and not, as stated, November, 1943.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the N.V.M.A.

Correspondents should write as briefly as possible and letters should not exceed 350 words.

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DISEASE OF NERVOUS ORIGIN

Sir,—Dr. Montgomerie's reference at the recent N.V.M.A. Congress held in London to a nervous disease of dogs "which is new to us" is particularly interesting. For years I have been encountering many cases of a heretofore unheard of nervous affection in all animals showing serious derangement of part, or whole, of the C.N.S., and while encephalitis is occasionally in evidence, a flaccid paralysis which simulates poliomyelitis is much more common. Occasionally a spastic paresis is seen, while innumerable other symptoms all of a nervous nature may be encountered. The affection appeared about the time of the outbreak of infantile paralysis nearly a decade ago, and is evidently due to a neuropathic virus. From time to time articles have appeared from British practitioners concerning various puzzling affections of a nervous nature. The symptoms described correspond to those which I have seen here. The result of the investigation into the mysterious mortality in sheep and cattle in the counties of Perth and Stirling will, I believe, prove of uncommon interest. Certainly poisoning cannot be reconciled with the malady that presents itself here. The fact that no serious notice has so far been taken of this disturbing malady is typical of the chronic ineptitude which one must expect from laymen, no matter how well-meaning, in control of our important livestock industry and its corollary veterinary service. Further comment is not necessary.

Yours faithfully,

T. Treacy.

Nenagh,
Co. Tipperary, Eire.
January 4th, 1947.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
Dec. 1st to 15th, 1946 ...	4	4	—	2	5
Corresponding period in—					
1945 ...	2	2	—	8	15
1944 ...	11	6	1	19	58
1943 ...	11	1	1	22	23
Total Jan. 1st to Dec. 15th, 1946 ...	91	41	7	92	345
Corresponding period in—					
1945 ...	115	127	6	118	906
1944 ...	181	175	8	233	1,396
1943 ...	275	18	9	224	524

Note.—The figures for the current year are approximate only.
* Excluding outbreaks in Army Horses.